

Two New Cryptobranch Dorid Nudibranchs from California

BY

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(1 Plate; 12 Text figures)

INTRODUCTION

DURING COLLECTION OF BIOLOGICAL MATERIAL by Pacific BioMarine Laboratories, Venice, California, several undescribed species of nudibranchs have been found. Presented here are descriptions of two new species of dorid nudibranchs. We express our sincere thanks to Dr. Rimmon C. Fay, for the opportunity to collect these species.

Thordisa Bergh, 1877

Known worldwide, the genus *Thordisa* is represented by only one species in the northeastern Pacific. As with so many other cryptobranch dorid genera, the diagnostic characters of *Thordisa* are highly disputed (ELIOT, 1910; KAY & YOUNG, 1969; LANCE, 1966; MARCUS, 1955; MARCUS, 1967 a & b). If agreement exists, it centers around the presence of pectinate marginal teeth, hamate lateral teeth bearing no denticulation, soft elongate dorsal papillae, an unarmed penis and the absence of labial armature.

The first known collection of this previously undescribed species of *Thordisa* was made in October, 1973 (Rimmon Fay, personal communication). This specimen was photographed but not preserved. Additional collections have been made since that time.

Thordisa rubescens Behrens & Henderson, spec. nov.

(Figures 1 through 7, 13 and 14)

References and Synonymy:

Thordisa sp.: Behrens, 1980:102.

Material examined: 1) Holotype: One specimen approximately 90 mm long live (67 mm long preserved) collected in 15 m of water, at Big Kelp Reef, Paradise Cove area, Los Angeles County, California (Lat. $34^{\circ}00'02''$ N; Long. $118^{\circ}47'02''$ W) on October 17, 1979 by Robert Henderson. This specimen is deposited in the collection of the Invertebrate Zoology Department, California Academy of Sciences (CASIZ), San Francisco, California (CASIZ Catalogue No. 015860). 2) Paratypes: One specimen (50 mm long preserved) collected in 19-22 m of water at Big Kelp Reef, Paradise Cove Area, Los Angeles County, California, on November 5, 1979 by Richard Rhode. The intact specimen has been deposited in the type collection of the U.S. Natural History Museum, Washington, D.C. (USNHM Type Series, No. 749790). 3) One specimen (36 mm long preserved) collected in 10 m of water at Palos Verdes, Los Angeles County, California (Lat. $33^{\circ}45'05''$ N; Long. $118^{\circ}22'47''$ W) on August 28, 1978 by Richard Rhode. The dissected specimen and its mounted radula are also in the CASIZ collection, Catalogue No. 015861. 4) One specimen (40 mm long preserved) col-

lected in 22 m of water at Big Kelp Reef, Paradise Cove Area, Los Angeles County, California, on October 8, 1978 by Robert Henderson. This dissected specimen and its mounted radula have been deposited in the type collection of the Los Angeles County Natural History Museum, LACM Type Series 1948. Color transparencies of living specimens of *Thordisa rubescens* are on file at CASIZ (Nos. 3724 and 3725), LACM and Santa Barbara Museum of Natural History, Santa Barbara, California (SBMNH) (Nos. 0001SL, 0002SL and 0003SL).

Description: The living animals measured from 55 to 90 mm long; preserved they measured 36 to 67 mm in length. The body is typically doridiform, oval with a bluntly pointed tail which extends slightly beyond the notum (Figures 1 and 13). The notum is convex, highest along the midline, sloping gradually to the margins. The entire dorsal surface of the notum is covered with inflated papillae of various sizes and shapes (Figures 2 and 14). Many are blunt, some conical, while others are inflated at mid-length and terminate in a tapering point.

Notably larger papillae are dispersed evenly over the notum, not being concentrated in any one region. The papillae of living animals were observed to shrink to less than one half their original size after only a short confinement in the aquaria. Protruding spicules are not localized and may occur anywhere on the papillae (Figure 2). The notal spicules are straight or slightly curved smooth rods (Figure 2). More dense near the surface of the notum, they form a reticulating system deep into the notal tissue.

The anterior margin of the foot is rounded to angular in outline and bilabiate with a slight cleft (Figure 3). The foot margins are parallel, while the foot width is about $\frac{1}{2}$ to $\frac{1}{3}$ the body width. The labial tentacles are blunt

and digitiform, arising independently on either side of the mouth, about $\frac{1}{4}$ the foot width on either side (Figure 3a).

The body color is brilliant red-orange, closely approx-

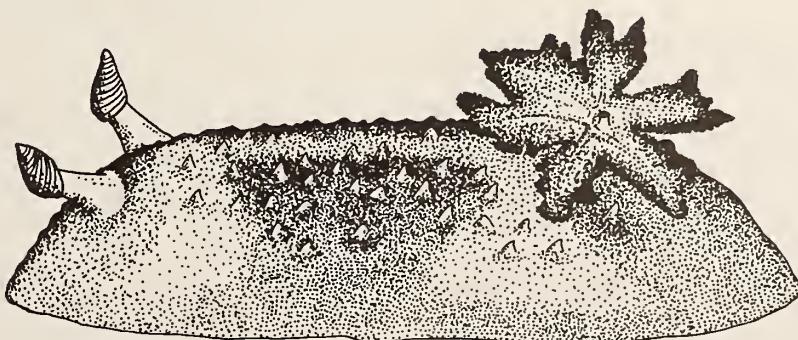
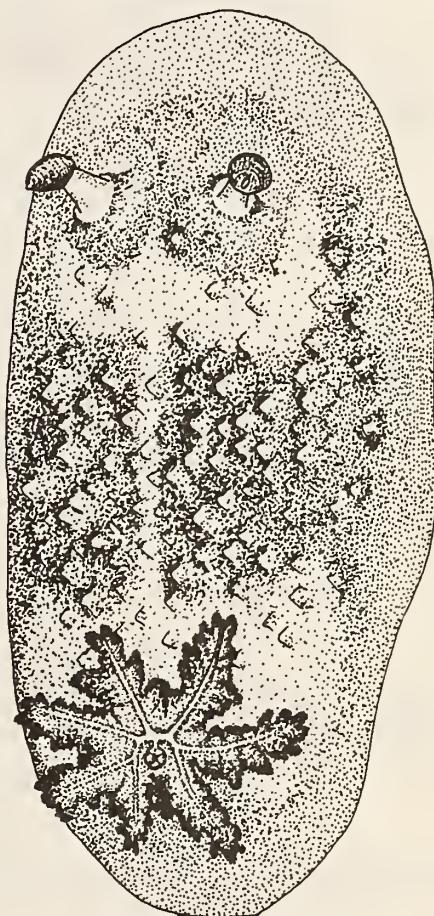


Figure 1

Dorsal and lateral view of *Thordisa rubescens*

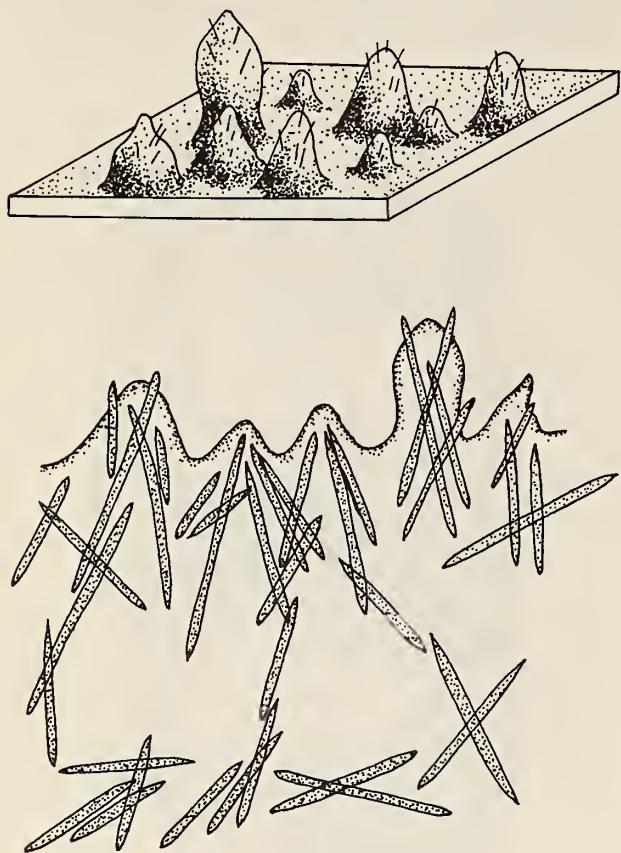


Figure 2

Plain and cross-sections of natal surface of *Thordisa rubescens*
papillae and spicules

imating that of the substrate from which it was collected, the sponge genera *Axinella* and *Lissodendoryx*. The notum is encrusted with gold flecks forming a halo around the branchial pit, a mid-dorsal stripe and half crescents posterior to the rhinophores (Figures 4 and 14). The intensity of this pattern varies between individuals and, in fact, in two specimens was barely discernible. Accompanying the gold flecks may be black subcutaneous specks and opaque white surface flecks. Highly papillate specimens may have a black apical spot on some of the larger papillae. The rhinophore stalk is white to yellowish-orange. The clavus is orange to brown and has white flecks, scattered over its length, but more concentrated near the tip. The branchiae are lighter in color than the body, varying from white to orange below and centrally. They become brown near the

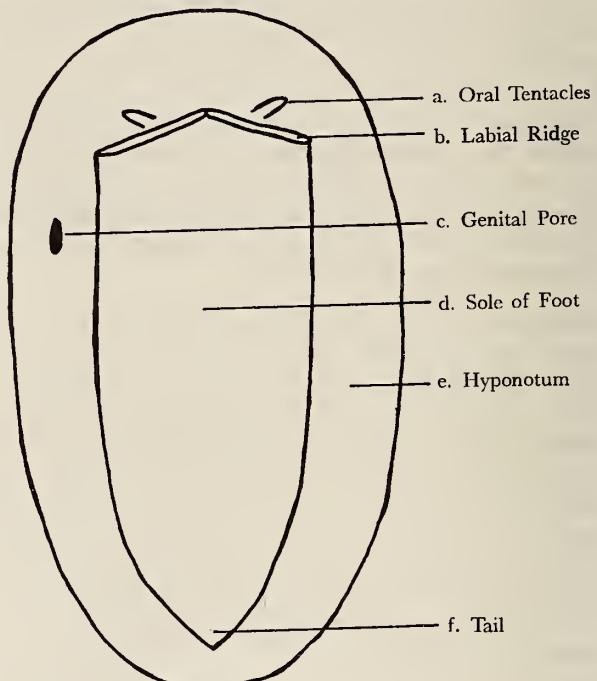


Figure 3

Ventral view of body of *Thordisa rubescens*
a - oral tentacles b - labial ridge c - genital pore
d - sole of foot e - hyponotum f - tail

tips. The upper surface of each gill is encrusted with brown flecks, upon which are larger, opaque white specks.

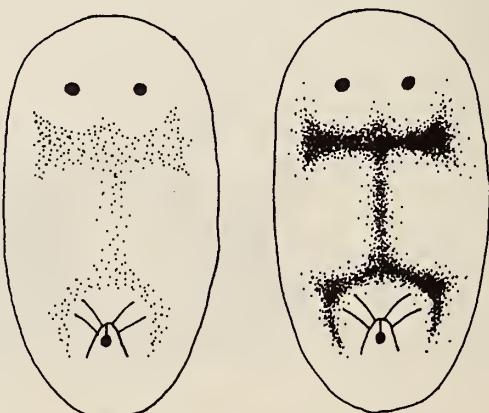


Figure 4

Schematic drawing of natal pattern in *Thordisa rubescens*

The edges of the branchiae are also highlighted with white flecks.

The rhinophores are long and retract into short, upright papillated sheaths. The stalk and clavus are equal in length. The clavus is deeply perfoliate with 20-21 diagonal lamellae. It has a shallow furrow along the anterior axis which terminates in a smooth, flattened tip.

The branchial plume is completely retractile into a branchial pit. The six bi- and tri-pinnate branchiae are upstanding and do not spread beyond the edge of the notum. The branchiae are joined by a horseshoe-shaped septum (Figure 5a), which is oriented posteriorly, encircling the anal papilla (Figure 5c). As in *Thordisa bimaculata* Lance, 1966 a characteristic septum (Figure 5b) connects the anterior side of the anal papilla to the horseshoe-shaped branchiae. The anal papilla is fluted distally into 5 lobes separated by 5 smaller lobes (Figure 5d).

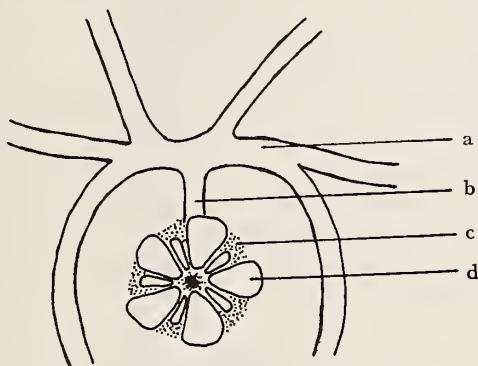


Figure 5

Branchial plume of *Thordisa rubescens*

- a - horseshoe-shaped septum connecting branchiae
- b - connecting septum
- c - anal papilla
- d - fluted margin of anal papilla

The radular formula is $39\text{-}40 \times 2\text{-}39\text{-}40\text{-}0\text{-}39\text{-}40\text{-}2$ at the 15th row. The innermost lateral teeth are small and hamate, increasing in size to the midpoint of the row, then decreasing again as they approach the edge of the radula (Figure 6a). The two outermost teeth are called marginals here, because of the distinctly different morphology compared to the laterals. The two marginals are bristled (Figure 6b & c). The innermost is hook-shaped, with a broad base (Figure 6c) and the outermost marginal is thin and as long as the anterior hook of the inner marginal (Figure 6b).

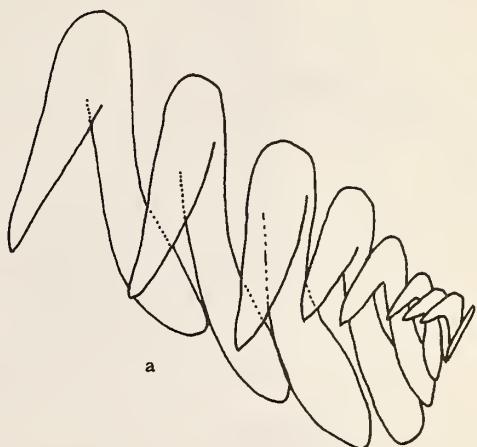


Figure 6

Radula of *Thordisa rubescens*

- a - lateral series, 27th row
- b - outer marginal tooth, 5th row
- c - inner marginal tooth, 5th row

The genital opening is located on the right side of the body, just below the hyponotum and somewhat behind the rhinophores (Figure 3c). The vagina bears a series of spines, which are arranged both in a ring around the orifice and longitudinally within (Figure 7a). Each spine consists of a flat, opaque white disc having a single hook arising from its center (Figure 7b).

The egg mass is a pinkish-orange coil of two or three whorls attached to the substrate on one edge. The egg mass laid by the specimen collected October 8, 1978 measured 30 mm in diameter, and 6 mm in height. The ribbon was three eggs wide and 48-50 eggs high. Egg ribbons were encountered on red sponge, bare rock and on *Lithothamnion* encrusted rock surfaces.

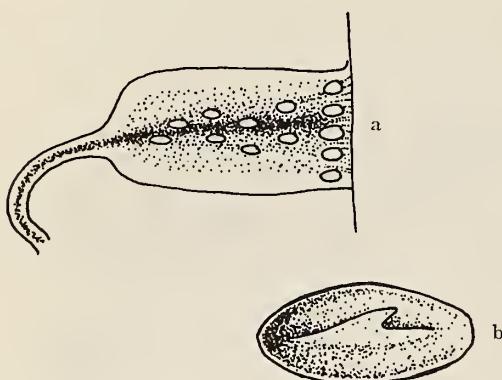


Figure 7

Genital armature of *Thordisa rubescens*
a - vagina, showing arrangement of spines b - spine

Thordisa rubescens is known subtidally only. All specimens have been collected on or near the red sponges, *Axinella* and *Lissodendoryx*. The holotype was found living in, and covered by the slime of, *Lissodendoryx*. The only visible part of this cryptobranch was the branchial plume. Egg masses similar to those laid by the specimen collected October 8, 1978, have been observed on *Lissodendoryx*.

Discussion: Because of the radular morphology, this species is most closely aligned with *Thordisa*. MARCUS (1955:142) and MARCUS & MARCUS (1967:91) significantly reduce the number of species of known *Thordisa*, because of dissimilarities in radula to the type species, *Thordisa maculigera* Bergh, 1877, yet they state that the genus has been reduced too much. We assign *T. rubescens* here, in light of the similarities in radula and other characteristics known, to *Thordisa*.

Of the worldwide species of *Thordisa*, *Thordisa sanguinea* Baba, 1955 approaches *Thordisa rubescens* most closely, in external features. In *T. sanguinea* however, the

notum is marked with three or four dark ocelli along the midline. Internally, the radula of *T. sanguinea* adds to the differences having a formula of $30 \times 35 \cdot 0 \cdot 35$, five to six of the teeth at the margin being pectinate.

Thordisa rubescens, although strikingly distinctive, could be confused superficially with the other three red cryptobranch dorids in the northeastern Pacific. It most closely resembles *Aldisa sanguinea* (Cooper, 1863) particularly those individuals of *Aldisa* with the tan saddle marking. The external difference is the gill, *Aldisa*'s being cone-shaped with eight to ten unipinnate branchial plumes. Internally, the radular differences are pronounced. A second species, *Rostanga pulchra* MacFarland, 1905, rarely exceeds 16 mm in length. Of particular importance is *Rostanga*'s unique rhinophore; as in *Aldisa*, this and the radula are strikingly different from that of *Thordisa*. The third species, *Platydoris macfarlandi* Hanna, 1951 lacks the large notal tubercles, having a smooth notum with convoluted margins. The radula of this species lacks the pectinate marginal teeth.

It is distinguished from the only other member of the genus recorded in the northeastern Pacific, *Thordisa bimaculata*, by the number of rhinophoral lamellae, *T. bimaculata* having only 14-16; by the absence of the labial cuticle; by radular count, *T. bimaculata* being $32 \times 6 \cdot 8 \cdot 29 \cdot 34 \cdot 0 \cdot 29 \cdot 34 \cdot 6 \cdot 8$; and by color pattern (LANGE, 1966).

The specific (trivial) name *rubescens* is chosen to call attention to its red body color.

Jorunna Bergh, 1876

Jorunna has recently received a detailed review (MARCUS, 1976). Marcus lists 12 valid and 4 questionable species worldwide. This genus is previously unknown from the northeastern Pacific.

Jorunna is characterized by MARCUS (1976) by the following: stiffened notal tubercles, generally caryophyllidia; laterals simple, marginals sometimes with irregular denticles; prostatic epithelium smooth; male duct not

Explanation of Figures 13 to 16

Figure 13: *Thordisa rubescens*. Palos Verdes, Los Angeles County, California; 35 mm

Figure 14: *Thordisa rubescens*. Holotype. Big Kelp Reef, Paradise Cove area, Los Angeles County, California; 90 mm

Figure 15: *Jorunna pardus*. Cat Rock, Anacapa Island, California

Figure 16: Egg mass of *Jorunna pardus*. Bowen's Point, Santa Cruz Island, California



14



15



16



sheathed, ending with a papilla without a stylet, or even without a papilla; vestibular gland with a stylet.

This previously undescribed *Jorunna* is probably the most abundant cryptobranch dorid in the California "Channel Islands". First collected by James R. Lance in 1962, it has since that time been recognized as a major component of the molluscan fauna of the islands. In addition to the material collected by the authors, we are grateful to Jim Lance and Dave Mulliner for the use of their material and for their support towards this description.

Jorunna pardus Behrens & Henderson, spec. nov.

(Figures 8 through 12, 15 and 16)

References and Synonymy

Jorunna sp.: Behrens, 1980:100.

Material examined: 1) Holotype: One specimen 45 mm long (preserved) collected in 5 m of water, at Cat Rock, Anacapa Island, California (Lat. $34^{\circ}00'15''$ N; Long. $119^{\circ}25'20''$ W) on October 25, 1979 by David W. Behrens. This specimen is deposited in the collection of CASIZ, Catalogue No. 015862. 2) Paratypes: A series of three specimens, 33, 35, and 35 mm long (preserved), collected concurrently with the holotype is also deposited in the CASIZ collection, Catalogue No. 015863. 3) A series of three specimens, 35, 37, and 38 mm long (preserved) collected concurrently with the holotype is deposited in the type collection of USNHM, Type Series No. 749791. 4) A series of three specimens, 25, 34, and 38 mm long (preserved) collected concurrently with the holotype is deposited in the type collection of LACM, Type Series No. 1949. 5) Two specimens, 30 and 34 mm long (preserved) collected in 15 m of water in La Jolla submarine canyon, San Diego County on October 7, 1975 by a USC dive class, are deposited in the type collection of SBMNH, Type Series No. 33599. Color

transparencies of living specimens of *Jorunna pardus* are on file at CASIZ (Nos. 3729 and 3730), LACM and SBMNH (Nos. 0005SL and 0006SL).

Description: The living animals measured up to 60 mm long (preserved, 45 mm). The body is typically doridiform,

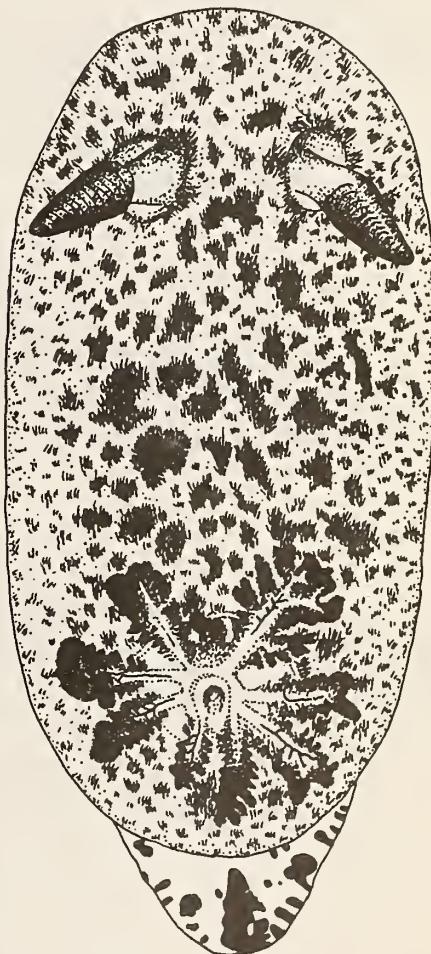


Figure 8

Dorsal and lateral view of *Jorunna pardus*

oval, with a bluntly rounded tail which extends beyond the notum (Figures 8 and 15). The notum is convex, highest along the midline, sloping gradually to the margins. The entire dorsal surface is covered with tall, bluntly rounded papillae (Figure 9a). Protruding dorsal spicules occur over the entire notal surface between papillae, as well as upon them (Figure 9b).

The spicules are smooth, straight rods, nearly 20 widths in length (Figure 9b). Near the notal surface, the spicules are perpendicular to the surface, while deeper in the notum, they are dispersed more randomly. Within the papillae, they are tightly packed, and form a radial pattern when viewed dorsally (Figure 9c).

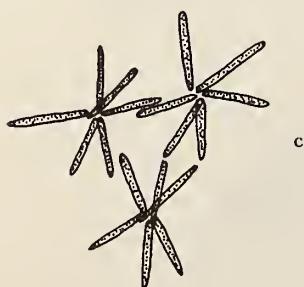
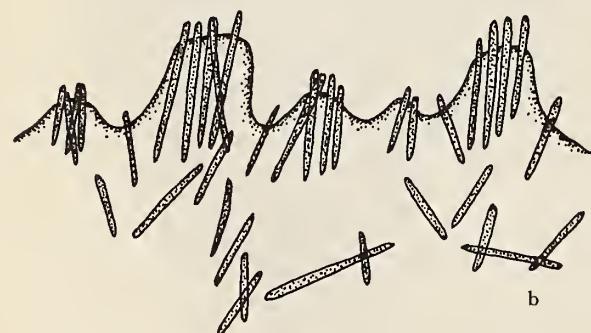
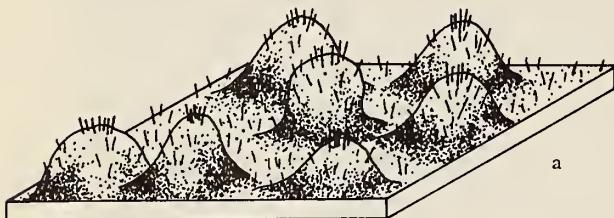


Figure 9.

Notal surface of *Jorunna pardus*

a - plain view b - cross section c - dorsal aspect of spicules

The anterior margin of the foot is truncate and bilobate (Figure 10). The foot margins are parallel and the foot is about 2/3 the width of the body. The labial tentacles arise independently and are very long, tapering to a point. In preserved specimens, foot length is about 6 times the width (Figure 10).

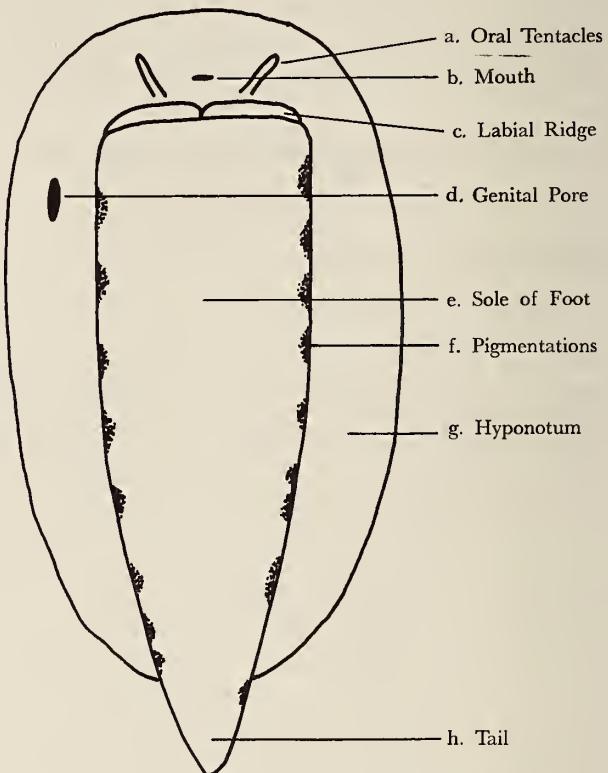


Figure 10

Ventral view of body of *Jorunna pardus*

a - oral tentacles	b - mouth	c - labial ridge
d - genital pore	e - sole of foot	f - pigmentation
g - hyponotum	h - tail	

The body color is cream to yellow with brown to black pigment concentrated into leopard-like spots (Figures 8 and 15). The spots vary in size. In some specimens, denser spotting gives the appearance of darker coloration. This is due to the existence of finer specks distributed between the larger spots. The dark color pigments may cover an individual papilla or be restricted to its base or even the periphery of the base. No such spotting exists on the hyponotum or the upper portion of the sides of the foot. The margin of the foot, however, has a series of similarly col-